

# GIS Data in 911 Call Routing

Mitch Pinkston - Digital Data Technologies, Inc



**Digital Data**  
Technologies Inc

SECONDS COUNT | ACCURACY MATTERS™



# Introduction

- The NENA NG9-1-1 GIS Data Model defines the layers and the schema. At minimum, Road Centerlines and PSAP Boundaries are required.
- The NENA i3 specification requires the Emergency Call Routing Function (ECRF) to use GIS data to determine which PSAP to route the emergency call to.
- The Location to Service Translation (LoST) protocol defined in RFC 5222 is used to query the ECRF with the location of the caller.



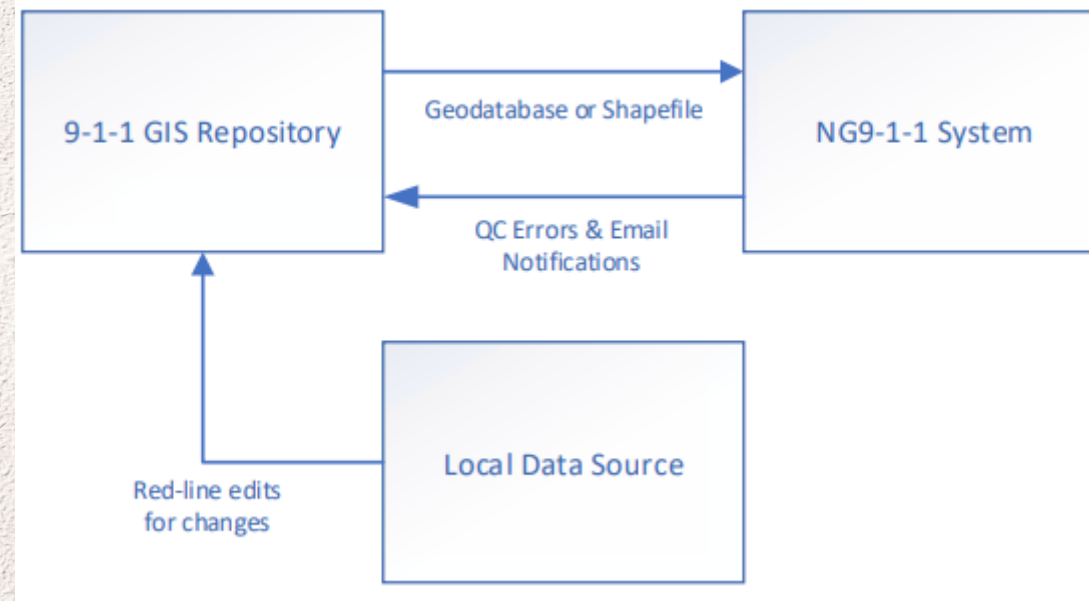
# Provisioning GIS Data into the ECRF

- GIS data is provisioned to the ECRF through the Spatial Interface (SI).
- The SI performs Quality Control (QC) checks to ensure the GIS data meets the acceptable criteria to be published to the ECRF.
- If the GIS fails the QC checks, then the errors are reported back to the GIS data provider.

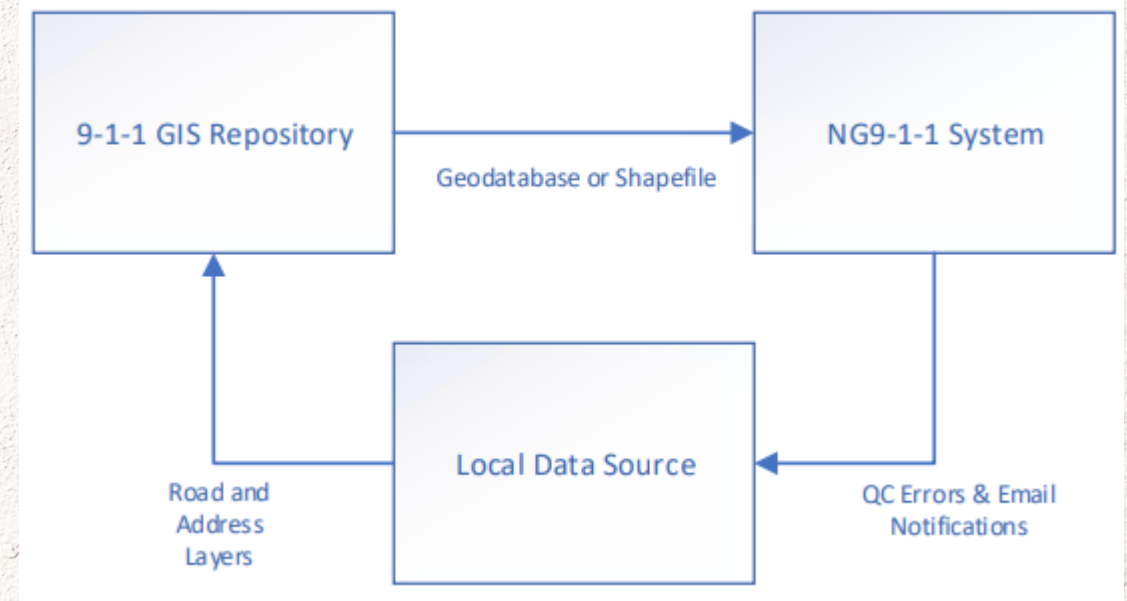


# Workflows

- Boundaries – managed by the State



- Addresses and Roads – managed by the local authority



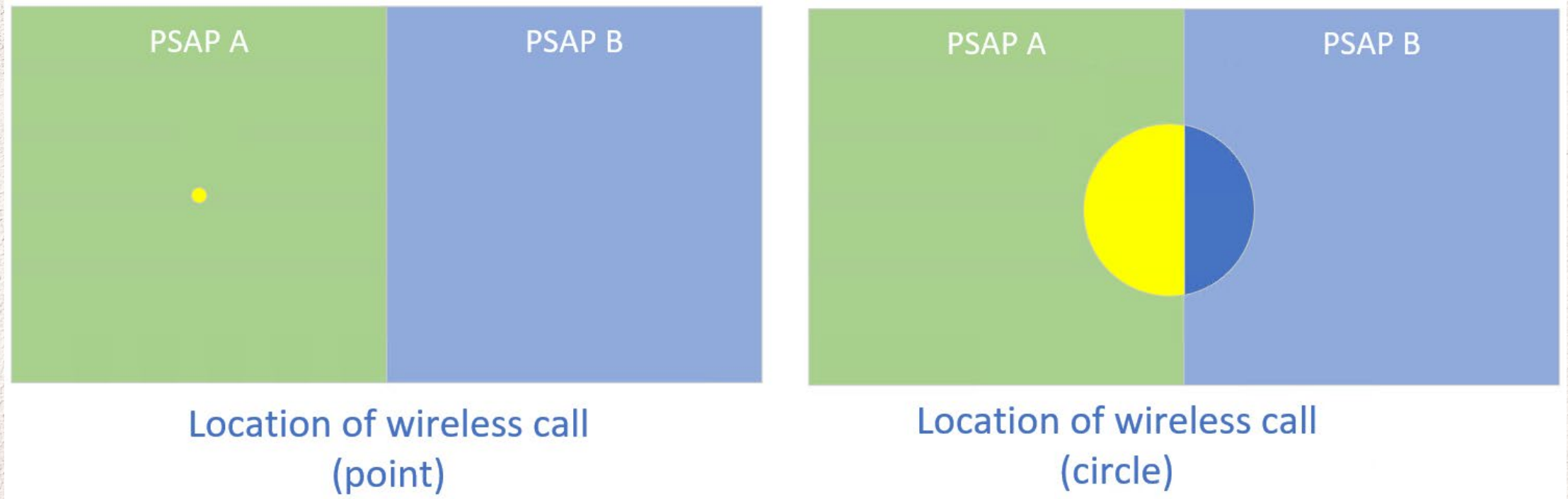


# How it Works – Wireless Call

- The first step is for the LoST server to determine if it is authoritative for the given location. It determines this by checking the location against the geodetic coverage defined in the ECRF.
- Next, the server queries the appropriate boundary layer with the geodetic location and performs a point in polygon intersection function to determine the PSAP to route the call to.
- In the case of two overlapping shapes, the server is configured to use the greatest area of overlap.



# How it Works – Wireless Call



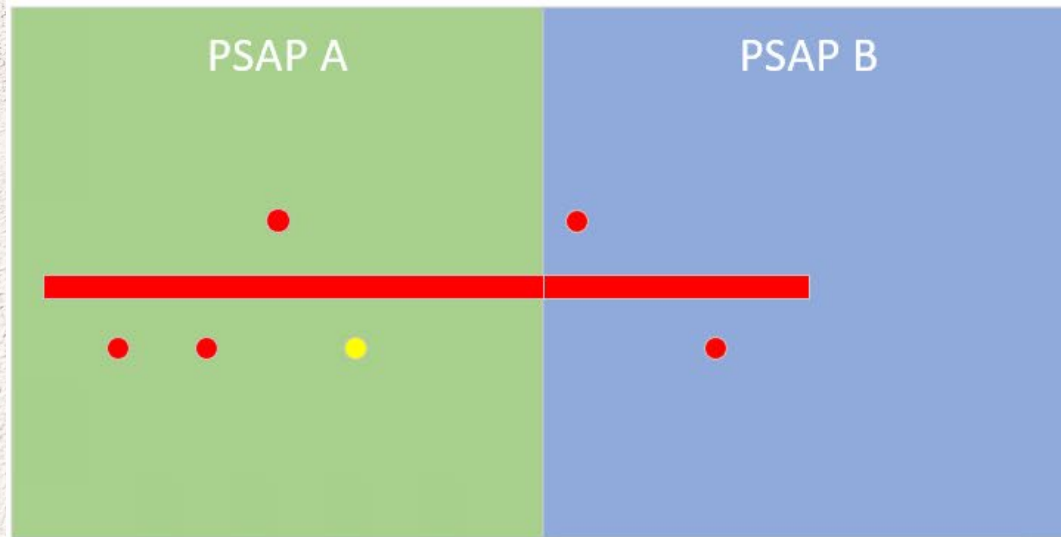


# How it Works – Wireline Call

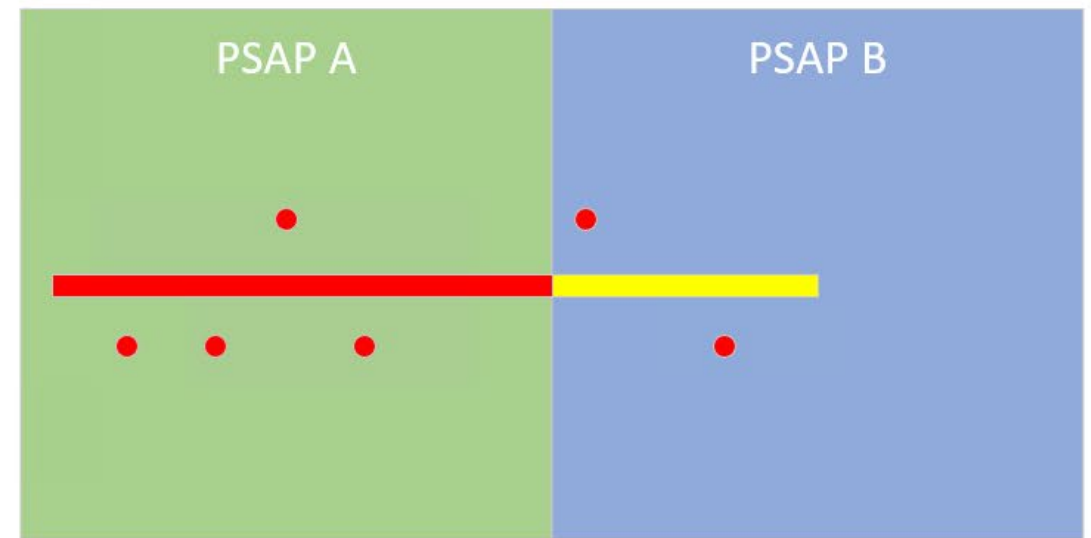
- The first step is for the LoST server to determine if it is authoritative for the given location. It determines this by checking the values in the query against the civic coverage defined in the ECRF.
- Next, the server queries the address data to try and find a single mapping. If it cannot, it will query the roads data.
- Once it finds a match to the correct attributes on the addresses or roads, it performs a point in polygon intersection function to determine the correct PSAP to route the call to.



# How it Works – Wireline Call



Location of wireline call  
(address point match)



Location of wireline call  
(road centerline match)



# Benefits of Geospatial Routing

- Accuracy for wireless calls
  - Wireless calls have a geodetic location and should be checked against spatial data for the most accurate routing.
  - Becomes more impactful as the caller location improves.
  - More accurate routing results in fewer transfers.

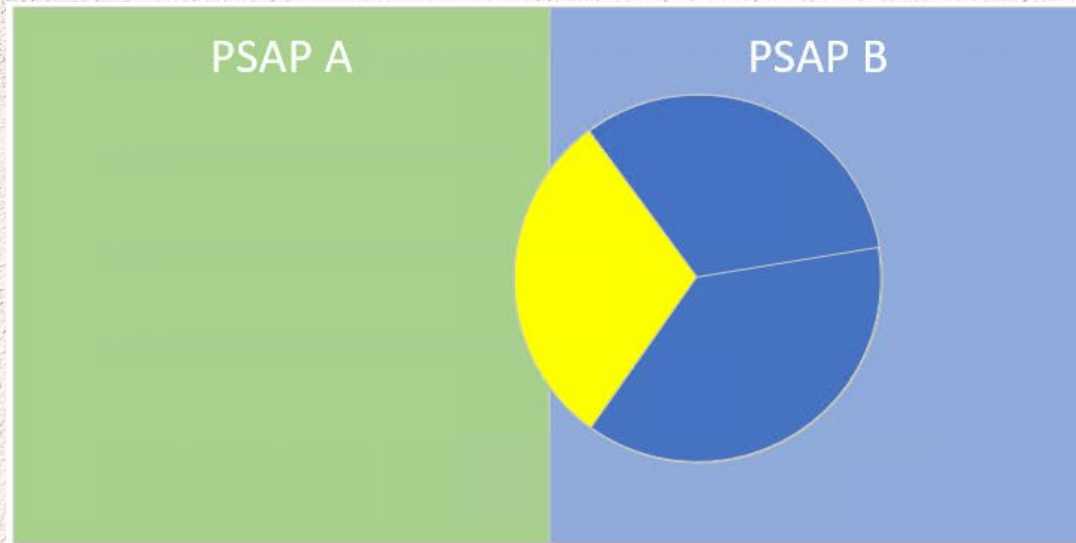


# Benefits of Geospatial Routing

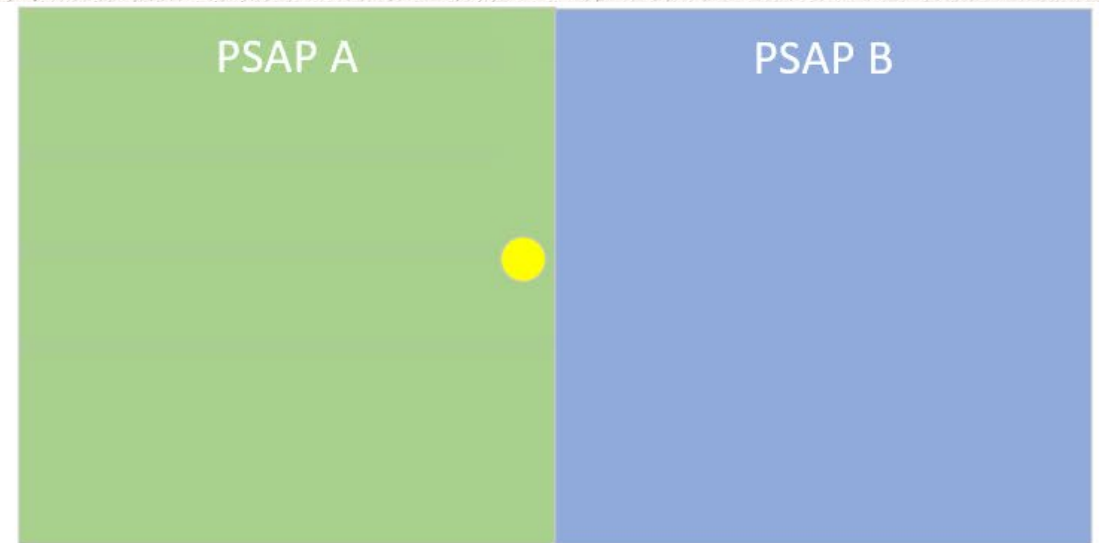
- Leverage the GIS data provided by the PSAP determine the routing.
- Polygons can be setup to account for special cases along borders, state highways, large bodies of water, DoD facilities, etc.
- Temporary override polygons can be created to account for localized events.



# Border Issues – Cell Tower vs Cell Phone



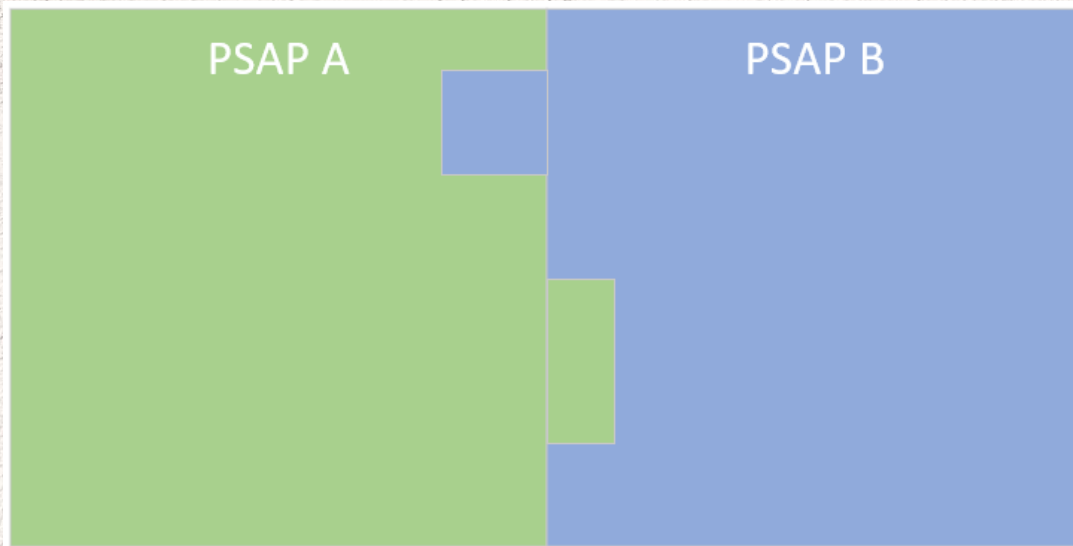
Call routes to PSAP B based  
on cell sector



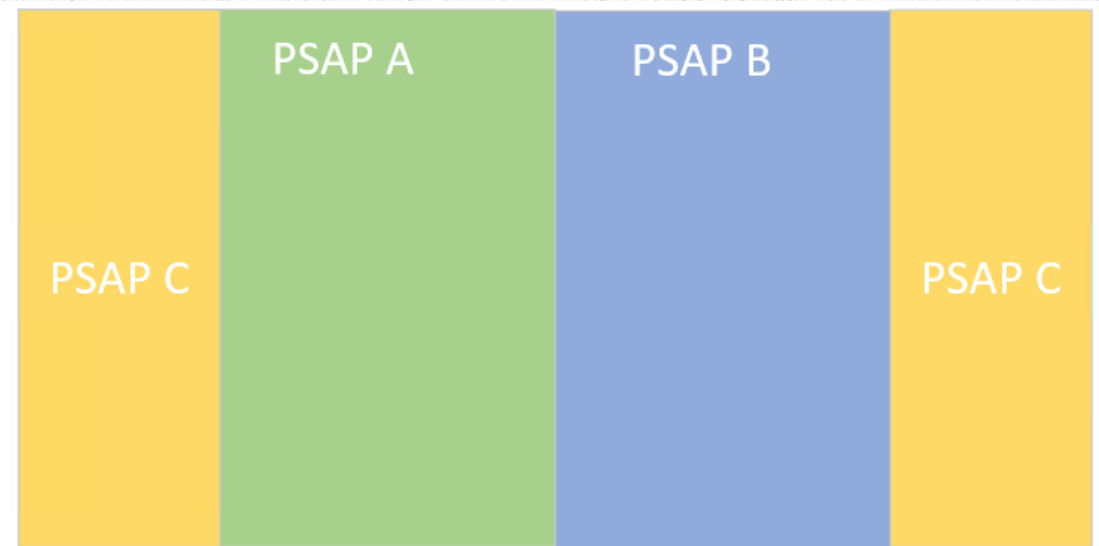
Call routes to PSAP A based  
on device coordinates



# Polygon Customization



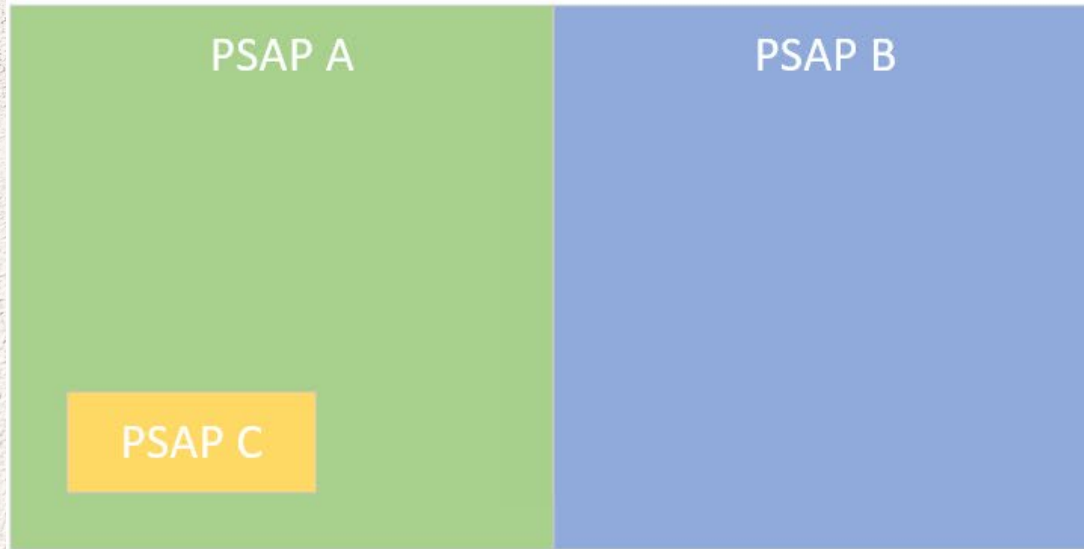
Polygons adjusted for special cases along the borders



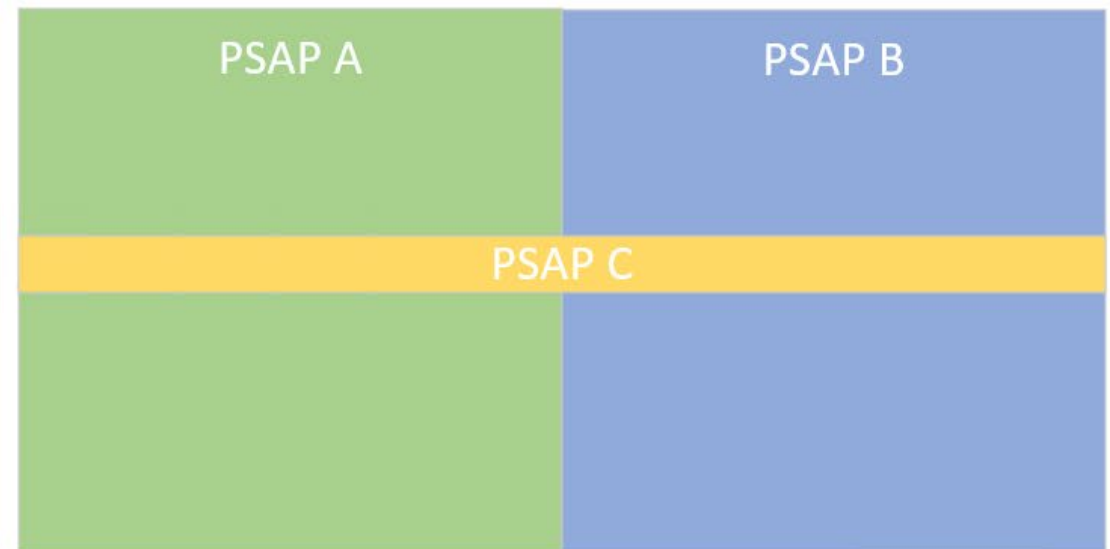
Polygons added for oceans or lakes



# Polygon Customization



Temporary override polygon  
added for localized event



Polygon added for state  
highways



# Benefits of Geospatial Routing

- Accuracy for wireline calls
  - GIS data provides a more granular representation of the caller location.
  - Civic Location Data Exchange Format (CLDXF) vs Master Street Address Guide (MSAG).
  - Handles border issues better, which reduces transfers.



# Civic Location Validation

- The GIS data is capable of providing more detailed location information than MSAG data.
- GIS data conforming the CLDXF standard has 29 fields available for location information attributes. MSAG has 9.
- MSAG can get you to a street. GIS can get you to the correct building, floor, unit, room or seat of a specific address point.



# Questions?